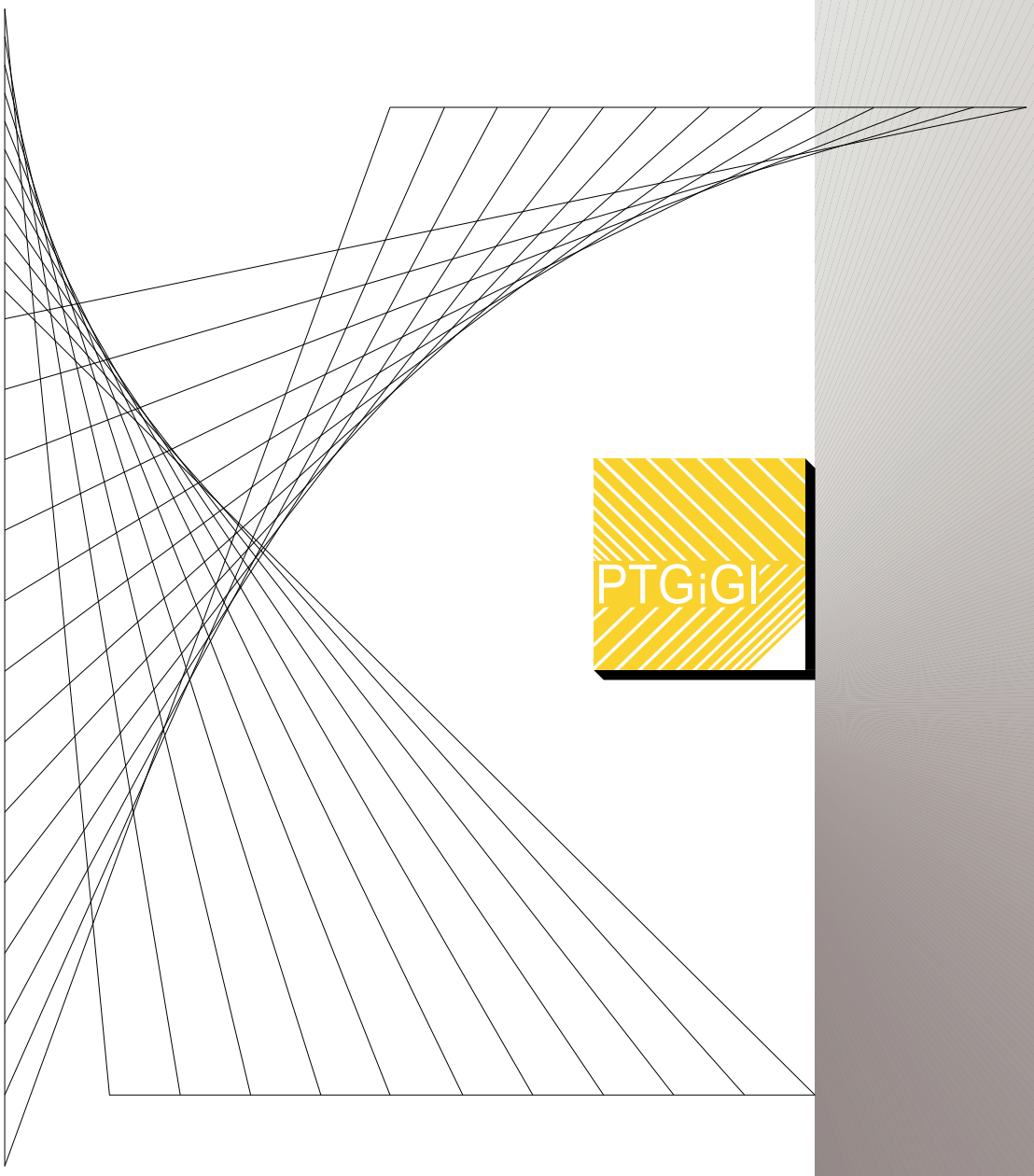
# THE JOURNAL BIULETYN OF POLISH SOCIETY FOR GEOMETRY AND ENGINEERING GRAPHICS

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Editorial office address:
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phone: (+48 32) 237 26 58

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# CLOUD-BASED TECHNOLOGIES IN TECHNICAL DRAWING

**Antanas VANSEVICIUS**
ORCID 0000-0002-1961-9765

Vytautas Magnus University Agriculture Academy,
Faculty of Water and Land Management, Institute of Hydraulic Engineering,
Universiteto str. 10, LT-53361 Akademija, Kauno r., Lithuania,
email: antanas.vansevicius@vdu.lt

**Abstract:** The advantages of cloud computing - flexibility, data security, lowering the cost of computer hardware and more - are leading to an increasing number of activities using these technologies. The first full cloud-based 3D CAD system, Onshape, allows not to worry about the technical problems inherent in common software in technical drawing instructions, but rather to focus on the core of the subject. Excellent information sharing capabilities and document creation history train learners to deal with real-world working conditions.

**Keywords:** cloud-based technologies, technical drawing, Onshape system

## 1 Introduction

In this age of information overload, Cloud Storage and File-Sharing Services become more and more widely used. These services provide seamless access to all your important data - Word docs, PDFs, spreadsheets, photos, and any other digital assets – available from wherever you are [1]. The use of various services, such as software development platforms, servers, storage and software, over the internet, are often referred to as the "cloud" is cloud computing [2]. This frees users from having to constantly update and maintain their software and systems as well as eliminates possible hassles with desktop-installed programs.

The first full cloud-based 3D CAD system, Onshape, is a great example of how cloud computing can be used in technical drawing training. With this system, we can focus on the business side of the discipline without having to deal with software installation, updates, file compatibility, information sharing, and more. The convenient information exchange feature allows for remote consultation, documenting history to discipline students, and train them for the labor market.

## 2 Web-based vs. Desktop Software

You must install a desktop application on the computer before it can run. There is no need for an internet connection if you need to work on a desktop application. Meanwhile, web-based software allows us to access it on demand by using a web browser. This kind of software always requires an internet connection. Moreover, you can also use online databases instead of your computer’s hard disc to store the files. All the documents and forms that you create using online software are stored online [3].

AutoDesk’s AutoCAD program is most commonly used for technical drawing fundamentals training. Training starts from 2D and then moves onto 3D technical drawing creation. There are many technical issues that we have to deal with when we use this program. There are as many as 120 CAD Hassles that we may encounter using this and other installation programs [4]. The issues of software installation, upgrading, version

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compatibility, information storage, and sharing are of major concern during the training process.

One of the main wishes of designers of different companies is to spend less time on non-design issues and they want the design process without meetings, emails or phone calls [5]. We also need to consider these labor market demands in the training process.

Onshape's unique full-cloud architecture, built-in data management, and real-time collaboration tools eliminate all of the hassles specific to installation programs. There are no downloads, installs, updates, license codes, servers to maintain. There are no files to lock, corrupt or lose via email. There are no crashes and no data loss. Everyone is always on the latest version [4]. This system allows not to worry about the technical problems inherent in common software in technical drawing instruction, but rather to focus on the core of the subject.

## 3 Onshape Cloud-Based CAD Platform

"Onshape is a computer-aided design (CAD) software system, delivered over the Internet via a Software as a Service (SAAS) model. It makes extensive use of cloud computing, with compute-intensive processing and rendering performed on Internet-based servers, and users are able to interact with the system via a web browser or the iOS and Android apps" [6].

This system is still quite new. According to a survey, carried out within the framework of the project "Development of Interactive and Animated Drawing Teaching Tools", this system is not yet well known in Estonia, Latvia, Lithuania, Poland or Slovakia (Fig. 1, [7]).

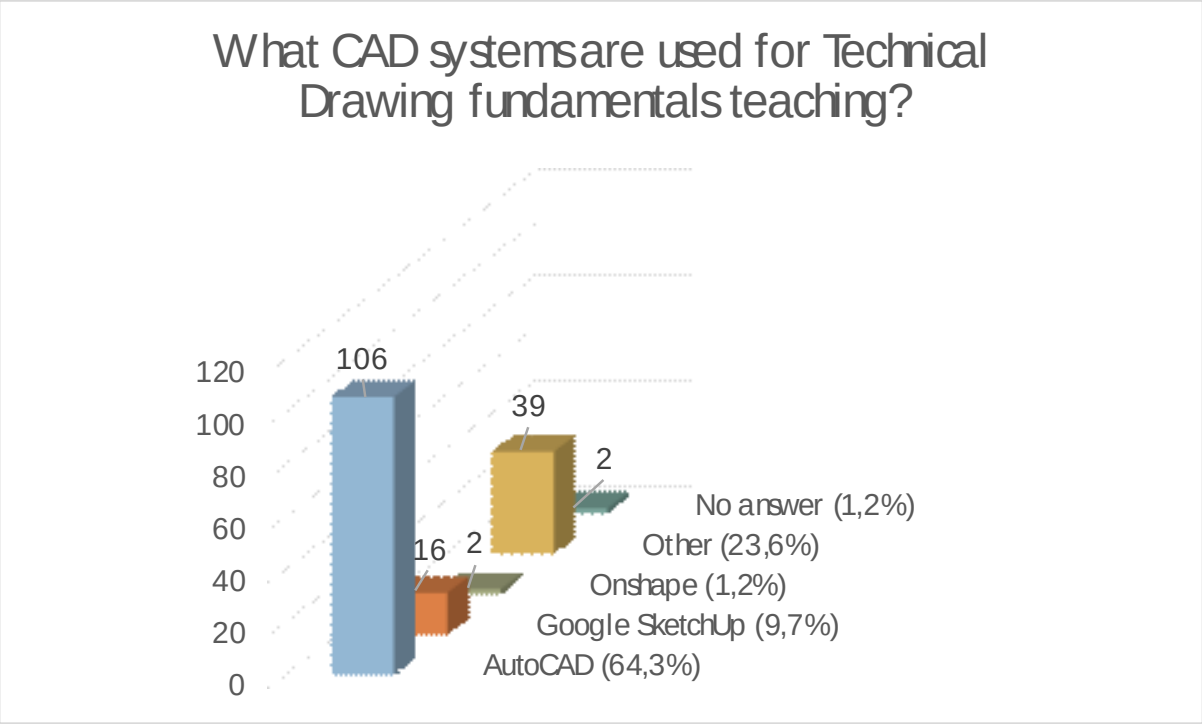


Figure 1: The most often CAD system used for teaching Technical Drawing fundamentals is AutoCAD [7]

Several examples of training materials prepared with Onshape [8] have raised questions about how this system is superior to AutoCAD. The resolution of technical issues discussed previously in this paper. When working with the system it is needed to adjust the working methods [9]. The Onshape system immediately creates a 3D model and the drawing is then generated automatically. Doing it this way, it is important to focus on developing your

drawing interpretation skills. It is advisable to use both the instructional models or details and their 2D views for tasks on individual technical drawing topics. When defending the work it is necessary to check how the students understand the drawings.

Excellent information sharing capabilities allow team members to work on the same document in parallel, consulting remotely (Fig. 2). This avoids human errors when saving and transferring information, and works with the latest version of the document.

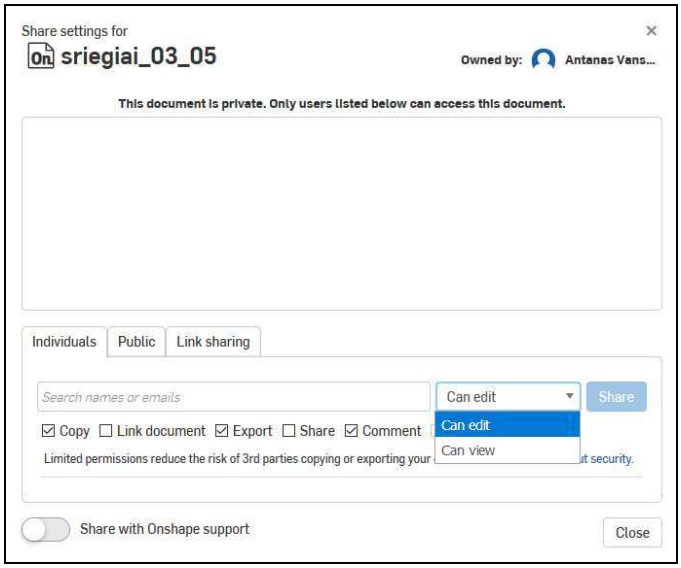


Figure 2: Document sharing settings

Document creation history (Fig. 3) gives control over the design process, develops students' sense of responsibility, and prevents the use of the Copy and Paste function.

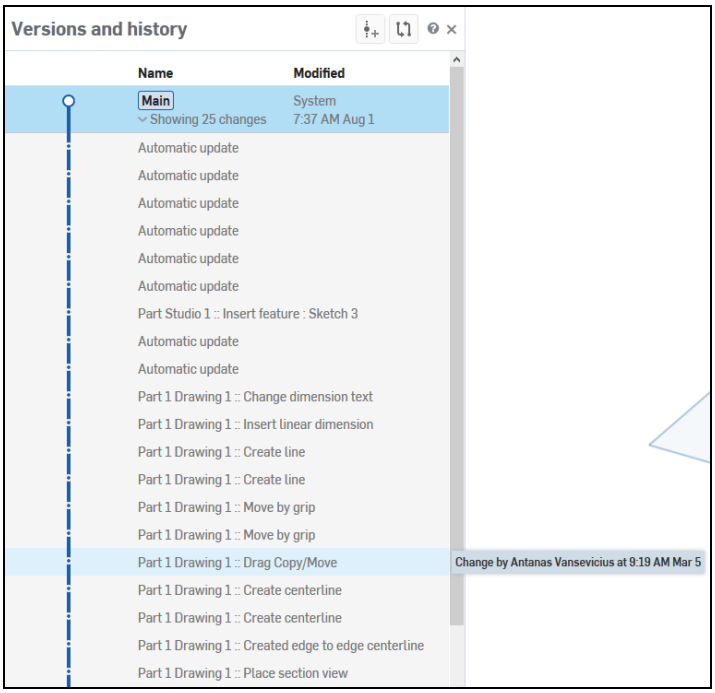


Figure 3: Document history

These tools prepare students for real working conditions.

## 4 Conclusions

1. Cloud-based technologies allow not to worry about the technical problems inherent in common software in technical drawing instruction, but rather to focus on the core of the subject.
2. The subject teaching methodology needs to be adjusted to the specifics of working with a cloud computing system.
3. Working with the Onshape system prepares students for real working conditions and develops their sense of responsibility.

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# TECHNOLOGIE OPARTE NA CHMURZE PUNKTÓW W RYSUNKU TECHNICZNYM

Zalety przetwarzania w chmurze punktów - elastyczność, bezpieczeństwo danych, obniżenie kosztów sprzętu komputerowego i inne - prowadzą do coraz większej liczby działań z wykorzystaniem tych technologii. Pierwszy, w pełni oparty na chmurze punktów, system CAD 3D Onshape nie stwarza problemów technicznych, które mogą występować w typowym oprogramowaniu w instrukcjach rysunków technicznych przez co pozwala skupić się na istocie tematu. Doskonałe możliwości wymiany informacji i historii tworzenia dokumentów ułatwiają, osobom uczącym się, radzenia sobie w rzeczywistych warunkach pracy.